POWERS. (C. A.)

A CONTRIBUTION TO THE TREATMENT OF FRACTURES AT THE LOWER END OF THE HUMERUS,

BASED ON THE ANALYSIS OF FIFTY CONSECUTIVE CASES.

BY

CHARLES A. POWERS, M.D.,

SURGEON TO THE OUT-PATIENT DEPARTMENT, CHAMBERS STREET HOSPITAL, NEW YORK.

FROM
THE MEDICAL RECORD,
December 22, 1888.

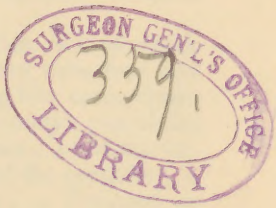
A CONTRIBUTION TO THE TREATMENT OF FRACTURES AT THE LOWER END OF THE HUMERUS,

BASED ON THE ANALYSIS OF FIFTY CONSECUTIVE CASES.

BY

CHARLES A. POWERS, M.D.,

SURGEON TO THE OUT-PATIENT DEPARTMENT, CHAMBERS STREET HOSPITAL, NEW YORK.



FROM
THE MEDICAL RECORD,
December 22, 1888.

TROW'S
PRINTING AND BOOKBINDING COMPANY,
NEW YORK.

A CONTRIBUTION TO THE TREATMENT OF FRACTURES AT THE LOWER END OF THE HUMERUS, BASED ON THE ANALYSIS OF FIFTY CONSECUTIVE CASES.[1]

AMONG the minor injuries which fall to the care of the general practitioner there are, perhaps, none which give him more concern than this to which your attention is invited. And I venture to say that few experienced surgeons undertake the treatment of one of these fractures without confessing to themselves a decided doubt as to whether the result in the given case is to be all that they can desire.

The importance of the theme, then, rather than the presentation of new methods of treatment, must be my apology for bringing it before you.

I will not occupy your time with a literary history of the subject, but briefly place before you an accurate picture of the cases which have been under my care in the out-patient department of the Chambers Street Hospital during the past eighteen months.

These have been fifty-six in number, six of which passed from observation shortly after they were hurt and which are excluded from the list, leaving fifty cases, classified as follows: Ten of the internal epicondyle; 12 of the internal condyle entering the joint-surface; 15 of the external condyle; 6 through the base of the condyles; 2 through the transverse epiphyseal line; 4 T-shaped or comminuted; 1 separation of the trochlear epiphysis.

---

[1] Read before the Surgical Section of the New York Academy of Medicine, May 14, 1888.

Nine of the patients were over twenty years of age, and 41 were under. Of the 41, 13 were under five; 12, between five and ten; 13, between ten and fifteen; 3, between fifteen and twenty. The age of the youngest was two years; that of the oldest, forty-three. Forty were in males, ten in females; forty-nine were simple fractures, one was compound.

CLASS A. *Fractures of the internal epicondyle.*—Of this lesion there were ten cases, of which the following is a fair illustration: P. B——, a boy, eight years of age, fell three feet, striking on the inner aspect of the left elbow, some half-hour before applying at the hospital. Examination revealed tenderness over the inner condyle, together with moderate swelling. Active movements at the elbow were feeble and painful. The internal epicondyle was freely movable, and on moving it crepitus was elicited. In full extension of the forearm it slipped a little downward, but on flexing the elbow to a right angle it was easily replaced.

The forearm was placed, midway between pronation and supination, at an angle of ninety degrees with the arm, and a plaster-of-Paris splint applied with equable, moderate pressure from the wrist to the upper third of the arm. This splint gave rise to no inconvenience, and was left in place ten days, at the expiration of which time it was removed and the joint inspected. The swelling had nearly disappeared and there were no untoward evidences. A fresh plaster splint was applied, and left in place until the twenty-eighth day, when it was removed. Firm union was now found to obtain. The joint was free from pain and swelling. The epicondyle was in place, moderately thickened.

The patient could flex the forearm to seventy-five degrees, and could extend it to one hundred and thirty-five degrees. Pronation and supination were nearly perfect. The parents were directed to bathe the elbow morning and night in water as warm as he could comfortably use, to follow the bath with inunction of neat's-foot oil, and

to apply a large flaxseed poultice when he went to bed, removing it in the morning. They were advised to confine his opposite arm to the side, beneath the clothing, and thus force him to use the affected limb in eating, playing, and his other daily habits.

The functions quickly improved, and on the sixtieth day they were completely restored. You will see that the elbow is now like its fellow, except for the moderate thickening which still persists at the seat of the fracture.[1]

Of the 10 cases—8 in children and 2 in adults—9 regained the functions perfectly; the other was lost sight of at the end of the second month, but at that time motions were nearly complete. In none was there resulting deformity, nor should we expect it in this class of cases, despite the assertion of Gross,[2] who says of fracture through the internal epicondyle: "Few cases recover without a certain degree of deformity, or even anchylosis." I know of no reason why there should be either, unless, perchance, the forearm flexors draw the fragment so far down that even complete flexion fails to permit its replacement.

I cannot insist too strongly on the importance of careful and systematic employment of the emollient measures, together with active motion after removal of the splint. On its removal the average range of motion found was thirty-five degrees, and this generally improved in direct proportion to the intelligence and faithfulness with which the patient followed directions.

Class B. *Fractures through the internal condyles entering the joint*—Twelve cases, of which the following may serve as an example:

T. D——, a boy, nine years of age, fell forcibly on the sidewalk, striking on the left elbow. Examination revealed all evidences of fracture through the humeral trochlea. There was a tendency to posterior displacement of the condyle, but when the forearm was in extension it made

[1] Twelve cases, illustrating the various classes, were exhibited before the Section.

[2] System of Surgery, vol. i., p. 979.

the normal angle with the arm. The elbow was placed at ninety degrees, midway between pronation and supination, and the condyle drawn a little forward to correct its displacement. Plaster splint was applied, and left in place twelve days; then removed; the condition found good and the splint reapplied. The second dressing was left on until the twenty-eighth day, at which time it was taken off and the following condition noted:

The elbow was painless, and but slightly enlarged; range of motion from eighty to one hundred and fifteen degrees; pronation and supination all but perfect; no apparent deformity. (It is well known that one cannot accurately judge of deformity at the elbow when the joint is flexed. It is only when in a nearly extended position that we can assure ourselves as to its presence or absence.) He was given the general directions as to massage, etc., and rapidly regained the functions. On the thirty-sixth day he could flex to sixty degrees, and extend to one hundred and thirty-five degrees. On the forty-second day flexion was perfect, and extension was to one hundred and fifty-seven degrees, while at the end of the third month the functions were completely restored. There was moderate thickening at the site of the fracture, but no real deformity.

That this form of treatment—confinement for four or five weeks without passive motion—is adapted to cases occurring in adults as well as in children is shown by this man,[1] forty-two years of age, who suffered a fracture through the internal condyle some fifteen months ago. It was accompanied by all of the usual evidences, and he was treated as were the cases whose histories I have just related. The splint was removed for good on the thirtieth day, at which time there obtained flexion to eighty degrees, with extension to one hundred and fifteen degrees. On the sixty-fifth day he had so far improved that he could flex to fifty degrees and extend to one hundred and fifty

[1] Patient exhibited.

degrees. The functions are now all complete except extension, which is five degrees short.

When this man first applied for treatment his joint was the seat of extreme swelling, and it is especially in these cases that I have found the plaster splint most admirable. I know of no dressing under which the effusion will so rapidly subside. It exerts an equable pressure and it keeps the parts absolutely at rest. It remains where it is placed. I apply it to all cases as soon as seen. If the injury is very recent and one expects further swelling, especially if he has subjected the joint to much of manipulation in arriving at his diagnosis, he naturally applies the splint rather more loosely. And I know of no dressing which affords the patients as much of comfort as this; they very rarely experience pain after the first twelve or twenty-four hours. And in but one case has the splint required removal; this was in a child who had a **T**-fracture. The dressing was put on rather too tightly and had to be taken off the following day; it had occasioned considerable swelling of the hand.

These cases went through a prolonged examination before a permanent dressing was put on. Most of them, before reaching me, were examined by the surgeon in charge of another class and by one or two of his assistants. After applying to me they were subjected to further handling by my assistant and myself. I do not know that any of them were the worse for this manipulation, and it assures me that diagnosis was as accurate as possible; for if we failed to agree in diagnosis the patient was given an anæsthetic, and we then conferred until we did agree.

To recapitulate the twelve cases of internal condyle: Nine perfectly recovered their functions; in one all motions became complete except extension, this being five degrees short; one is *said*[1] to be perfect, though he has not been seen, and one is yet under treatment. In none is

---

[1] I have since examined this patient and found the joint free from deformity and the functions completely restored.

there deformity; one cannot consider the normal callous thickening which follows any fracture as true deformity.

Class C. *Fractures through the external condyle entering the articular surface.*—These may run from the outer border downward and inward to the capitellum, or farther in, reaching the trochlea. It is, however, most difficult to determine just the extent of the line, especially if there be much of swelling, and I have been content with putting them in one general class. Extra-articular fracture in this region I have not seen.

The general treatment has been as in the preceding classes. Of late, when first seen, the forearm has been placed in extension, and its angle with the arm compared with that of the opposite side; if no difference be noted, the elbow is incased in plaster at the angle of ninety degrees, but if there be a loss of the "carrying point" it is abducted to its proper position and put up at about one hundred and thirty-five degrees for a couple of weeks, at the end of which time it is brought up to the right angle.

Case.—S. M——, a boy, five years of age, applied at the hospital, August 11, 1887, with a history of having fallen on the left elbow twenty-four hours previously. The distance of his fall was not known. He was found to have a fracture of the external condyle extending to the trochlear surface, with all regular evidences and slight posterior displacement. It was reduced, and put up in plaster at a right angle. Examined on the tenth day, and position found to be excellent. Splint taken off on the twenty-second day, at which time there was union with thickening and broadening of the condyles; flexion to eighty degrees, extension to one hundred and thirty degrees, pronation and supination all but perfect. General advice. On the twenty-sixth day (this was four days later) there was flexion to seventy-five degrees, extension to one hundred and fifty degrees. On the fortieth day flexion was perfect; extension, a few degrees short. Now all motions are complete, but you find the forearm more

nearly in a straight line with the arm than on the opposite side.

I show you also a boy who was injured on May 13, 1887, just one year ago. He was treated in the same way, but did not escape deformity. The external condyle is very prominent externally and a trifle displaced backward. It simulates the "gunstock" deformity, yet, if you carefully compare the inner contour of the extended limb with that on the opposite side, you will see that there is no difference. The deformity is due to bony prominence, not to a changed axis of the forearm.

The results in these 15 cases of external condyle are not all that I could desire. I have noted 8 of them as perfect both in position and functions; 2 present no deformity, but the functions are a little short of complete; 2 have perfect functions, but a moderate degree of deformity; in 2 there is both deformity and limited motion, the latter, however, amounting to but a few degrees; 1 case is yet under treatment.[1] I have no doubt that in each the function will be completely restored, as its limitation does not in any case seem to be mechanical.

In each case the deformity is due to a marked prominence of the condyle and its slight backward displacement; in none is there a reversal of the normal elbow obliquity—the "gunstock" deformity.

Class D. *Fracture through the base of the condyle.*—Six cases—4 in children, 2 in adults; 3 were transverse, 3 oblique, the line of fracture in the latter running from a point somewhat above the internal condyle downward and outward to the external condyle. In all, the lower fragment was strongly drawn backward, occasioning the classic similarity to a posteriorly dislocated forearm. All were put up at a right angle, the forearm, which controls the lower fragment, strongly drawn forward until the epicondyles very fully regained their relation to the long axis

[1] This patient has since been discharged, with a perfect result.

of the shaft. Of the transverse fractures two recovered perfectly, and the other is, as you see, in perfect condition except that complete flexion is short, this being prevented by the coronoid process impinging on a considerable anterior callus. The oblique fractures occasioned more of trouble; one, in a child, resulted in extreme gunstock deformity.

Case.—M. C——, a girl, aged three, injury not known; very much of swelling; lower fragment strongly drawn up. Placed at right angle, thinking that the deformity was well corrected, and plaster splint applied. The parents did not return with her until the thirty-ninth day, when the splint was removed. The external condyle was found to be very prominent, with bony fulness at the flexure of the elbow. Motion from eighty degrees to one hundred and ten. Six weeks later she had regained the complete use of the joint, with the exception of extreme flexion. The lower fragment was displaced upward and inward, and there was marked gunstock deformity. Had the patient returned as directed, the splint would have been removed at the end of ten days or two weeks, when deformity could, I think, have been corrected. In support of this I will ask you to contrast the following case:

B. C——, a man, aged twenty-nine, fell three hours before his admission to the hospital, a distance of six feet, striking on the postero-external aspect of the left elbow. Oblique fracture through the condylar base, the lower fragment being strongly drawn backward, upward, and inward. The deformity was thought to be reduced, and the elbow put up at an angle a little greater than that of a square. The splint was removed on the fourteenth day, and the fragment found to have slipped a little inward. The forearm was now abducted to correct the deformity, and fixed at an angle of one hundred and thirty degrees. Splint removed on thirty-second day; union; motion through an arc of fifty degrees. Six weeks later the functions were fully restored. I show him to you

now; you see that there is much thickening, but no true deformity, the extended elbow having practically the same obliquity as its fellow.

These oblique fractures did not enter the joint, for the external condyle moved with the lower fragment.

Class E. *Separation of the lower epiphysis.*—Two children, one two and the other six years of age, presented themselves with this lesion, and in each a perfect result was attained by simple confinement at a right angle, the lower fragment being drawn well forward as in the fractures through the base.

Class F. *Comminuted fractures*—. Four cases, of which the following are brief histories:

Case I.—M. G——, three and a half years of age, girl; one-half hour before admission slipped to the floor from a bed, striking on the right elbow. T-shaped fracture, with all of its evidences. Plaster splint applied at once, but it was put on rather tightly, and swelling necessitated its reapplication the following day. On the twenty-fifth day there was union; functions, ninety and one hundred and fifteen degrees; elbow much thickened. The functions gradually returned, and are now complete. There is no deformity.

Case II.—E. V. E——, a man, thirty-six years of age, applied for treatment December 31, 1887, with a history of having sustained an injury to the left elbow, while in a state of intoxication, some twelve hours previously. The patient was a very fat man; he was grossly addicted to alcohol, and during his treatment was frequently under its influence. The lower end of the humerus was found to be the seat of a comminuted fracture, the precise lesions in which could not be determined. It felt almost like the "bag of beans," and I judged that there must be several fragments. There was great deformity, and the joint was freely movable in all directions. The parts were moulded into shape as best one could, and a plaster splint applied with the elbow at a right angle. It was frequently examined. There was no union until the

fortieth day, and even then it was not firm. Despite all efforts it became anchylosed, and at the request of the patient the angle was fixed at one hundred and fifteen degrees (he is a telegraph-operator and this is the most convenient position for him). He is now in a Christian home for the cure of his alcoholism.

Case III.—F. R——, a boy, sixteen years of age, sought treatment at the hospital January 31, 1888, suffering from a typical T-shaped fracture of the left humerus. It was compound posteriorly, the lower end of the upper fragment having come down through the skin, making a wound a trifle smaller than the end of the little finger. The wound was very carefully dressed by Dr. Kimball, of the house-staff, who applied a right-angled splint, and advised the patient to seek house or hospital treatment. This, however, he refused to do, and insisted upon returning as an out-patient. I did not disturb the dressing until the seventh day, when it was removed under ether. The wound was found to be occluded; the position apparently good, though there was very much of swelling. Plaster applied with the elbow at a right angle; union on the thirty-first day; flexion to seventy-five degrees; extension to one hundred and ten degrees; very much thickened. The patient was given careful advice as to baths, massage, use, and the like, but he never followed them and did not return to the hospital. I saw him a few days ago, and found the functions limited. There was flexion to eighty-five degrees and extension to one hundred and twenty-five degrees. Pronation and supination were about one-half. I could not judge well regarding the deformity, for the limb could not be sufficiently extended, but it seemed to be limited to a broadening of the condyles.

Case IV.—J. W——, a boy, seven years of age, sought treatment for an injured elbow May 11, 1887. He was carefully examined under ether, and the left humerus found to be the seat of an epiphyseal separation through the condyles, the internal epicondyle being also broken

No. of case.	Age.	Sex.	Date when first seen.	Lesion.	Results.		Remarks.
					a. Functional.	*b.* As to deformity.	
1..	11 yrs..	M.	Nov. 3, 1886....	Fracture through the internal epicondyle.	Perfect	None.	
2..	14 yrs..	M.	Dec. 15, 1886...	Fracture through the internal epicondyle.	Perfect	None.	
3..	11 yrs..	M.	Jan. 10, 1887...	Fracture through the internal epicondyle.	Perfect	None.	
4..	3 yrs..	F.	Feb. 21, 1887...	Fracture through the internal epicondyle.	Perfect	None.	
5..	17 yrs..	M.	March 12, 1887.	Fracture through the internal epicondyle.	Extension to 170 degrees.....	None.	
6..	45 yrs..	M.	June 1, 1887....	Fracture through the internal epicondyle.	Perfect	None.	
7..	31 yrs..	F.	June 11, 1887...	Fracture through the internal epicondyle.	Perfect	None.	
8..	8 yrs..	M.	Nov. 15, 1887...	Fracture through the internal epicondyle.	Perfect	None.	
9..	14 yrs..	M.	Nov. 27, 1887...	Fracture through the internal epicondyle.	At end of 3d month: flexion to 75 degrees, extension to 145 degrees, then lost sight of.	None.....	This patient received no care at home, and could not be made to follow advice as to active motion, massage, etc.
10..	14 yrs..	M.	March 30, 1888.	Fracture through the internal epicondyle.	Perfect	None.	
11..	26 yrs..	M.	Nov. 13, 1886...	Fracture through the internal condyle entering joint.	Perfect	None.	
12..	10 yrs..	M.	Nov. 14, 1886...	Fracture through the internal condyle entering joint.	Perfect	None.	
13..	13 yrs..	M.	Feb. 2, 1887....	Fracture through the internal condyle entering joint.	Perfect	None.	
14..	41 yrs..	M.	Feb. 12, 1887...	Fracture through the internal condyle entering joint.	Extension about 5 degrees short of complete, otherwise perfect.	None.....	The functions were perfectly restored, Oct. 10, 1888.
15..	15 yrs..	M.	March 30, 1887.	Fracture through the internal condyle entering joint.	Perfect	None.	
16..	14 yrs..	M.	April 17, 1887..	Fracture through the internal condyle entering joint.	Perfect	None	This boy was sent to a reformatory when the functions were yet a few degrees short of complete. I was told by his parents, however, that he regained them perfectly, and so note.
17..	12 yrs..	M.	April 27, 1887..	Fracture through the internal condyle entering joint.	Perfect	None.	
18..	9 yrs..	M.	Sept. 17, 1887..	Fracture through the internal condyle entering joint.	Perfect	None.	
19..	12 yrs	M.	Nov. 4, 1887....	Fracture through the internal condyle entering joint.	Perfect, except extension; this 10 degrees short.	None.	
20..	2 yrs..	F.	Nov. 10, 1887...	Fracture through the internal condyle entering joint.	Perfect	None.	
21..	13 yrs..	M.	Feb. 18, 1888...	Fracture through the internal condyle entering joint.	Extension 10 degrees short....	None.	
22..	32 yrs..	M.	April 10, 1888..	Fracture through the internal condyle entering joint.	.....	.....	Patient was under treatment when paper was read; result now noted as perfect in every way (Nov. 1, 1888).
23..	7 yrs..	M.	Oct. 8, 1886.. .	Fracture through the external condyle into joint.	Perfect	None.	
24..	3 yrs..	M.	Jan. 22, 1887...	Fracture through the external condyle into joint.	Perfect	External condyle prominent, externally displaced a trifle backward.	
25..	6 yrs..	M.	Feb. 19, 1887...	Fracture through the external condyle into joint.	Extension 10 degrees short....	External condyle much thickened and prominent.	
26..	3 yrs..	M.	March 13, 1887.	Fracture through the external condyle into joint.	Functions nearly perfect on fortieth day.	None	Patient sought with a view to ascertaining present condition, but cannot be found.
27..	6 yrs..	M.	May 15, 1887...	Fracture through the external condyle into joint.	Perfect	External condyle much thickened and very prominent.	
28..	7 yrs..	M.	June 13, 1887...	Fracture through the external condyle into joint.	Perfect	None.	
29 .	11 yrs..	M.	July 27, 1887...	Fracture through the external condyle into joint.	Perfect	None.	
30..	5 yrs..	M.	Aug. 11, 1887...	Fracture through the external condyle into joint.	Perfect	None.	
31..	8 yrs..	M.	Oct. 15, 1887...	Fracture through the external condyle into joint.	Perfect	None.	
32..	4 yrs..	F.	Dec. 2, 1887....	Fracture through the external condyle into joint.	Flexion and extension both a little short of complete.	None.	
33..	6 yrs..	M.	Jan. 2, 1888....	Fracture through the external condyle into joint.	Perfect	None.	
34..	3 yrs..	M.	Jan. 8, 1888....	Fracture through the external condyle into joint.	Perfect	None.	
35..	3 yrs..	M.	Jan., 1888.....	Fracture through the external condyle into joint.	Perfect	None.	
36..	7 yrs..	M.	March 9, 1888..	Fracture through the external condyle into joint.	Flexion to 80 degrees, extension to 145 degrees.	External condyle displaced backward, and prominent externally.	
37..	30 yrs..	F.	April 3, 1888...	Fracture through the external condyle into joint.	Under treatment when paper was read, but since discharged with a perfect result.		
38..	4 yrs..	F.	May 9, 1887...	Fracture through the base of the condyles; transverse.	Flexion 12 degrees short of complete, other functions normal.	None.	
39..	3 yrs..	F.	Sept. 13, 1887..	Fracture through the base of the condyles; transverse.	Perfect	None.	
40..	4 yrs..	M.	Oct. 9, 1887....	Fracture through the base of the condyles; transverse.	Perfect	None.	
41..	3 yrs..	F.	Sept. 13, 1887..	Fracture through condylar base; *oblique*.	Flexion 15 degrees short, otherwise complete.	Extreme gunstock deformity..	Patient was not brought back by parents until thirty-five days after application of first splint (see previous history).
42..	29 yrs..	M.	Feb. 3, 1888....	Fracture through condylar base; *oblique*.	Perfect	None.	
43..	32 yrs..	M.	March 21, 1888.	Fracture through condylar base; *oblique*.	Patient under treatment when paper was read, has since perfectly recovered.		
44..	2 yrs..	F.	Jan. 22, 1887...	Diastasis through condyles.....	Perfect	None.	
45..	6 yrs..	M.	Sept. 2, 1887...	Diastasis through condyles..... ...	Extension to 157 degrees.....	None.	
46..	3 yrs..	F.	Oct. 14, 1887...	"T"-shaped.....	Perfect	None.	
47..	7 yrs..	M.	May 11, 1887...	Separation of epiphysis; meeting fracture through internal condyle.	Extension to 165 degrees.....	None.	
48..	36 yrs..	M.	Dec. 31, 1887...	Extreme comminution; simple.....	Anchylosis	.....	See previous history.
49..	16 yrs..	M.	Jan. 31, 1888...	"T"-shaped; compound.....	Flexion to 85 degrees, extension to 125 degrees.	.....	See previous history.
50..	8 yrs..	M.	.....	Separation of trochlear epiphysis.....	Perfect.....	None.	

off and the fissures apparently communicating. He was treated as were the preceding cases, and recovered without deformity. The function of extension, however, did not return, and at the end of the fourth month it was limited to one hundred and sixty-five degrees. The other motions were, however, perfect.

Of these four comminuted fractures one was discharged with a perfect result, one is perfect except that extension is fifteen degrees short, one is anchylosed, and one has but very limited functions; still, I feel that you will agree with me that the latter two cases were very difficult ones. The anchylosed joint (the only one out of fifty, by the way, in which this result occurred) could not have been brought out differently, I think, by any method of treatment. The boy with the compound fracture paid no attention, after removal of the splint, to the functions, but simply carried the arm in the fixed position. He will neither move it nor allow others to do so.

The fiftieth case of my series, one which I judged as a separation of the trochlear epiphysis, has already been presented to this Section, and an account of it may be found in THE MEDICAL RECORD for March 17, 1888.

To recapitulate the results in the following fifty cases: Thirty-three completely regained the functions and present no deformity; in seven the functions are a few degrees short of full; in one they are very limited; in two there is moderate deformity with a slight loss of function; in one there is extreme gunstock deformity with complete use of the limb; one is anchylosed, and three are yet in the second month of treatment.

If you will allow me to subtract the three [1] which are progressing favorably under present treatment, and to predict, as I think we honestly can, a full restoration of functions in the seven which are now a few degrees short,

---

[1] These are noted in the table as now completely cured (November 1, 1888).

we shall have forty cures out of forty-seven cases, four fair results, and three distinctly bad. I must claim, however, that in two of these last three cases the result was unavoidable.

In most of the foregoing cases the injury was ascribed to a fall on the elbow, this varying from a slip on the sidewalk or a fall from a chair to a descent of ten feet; in two to a fall on the hand, in one to the passage of a wagon-wheel, in one to a violent wrench to the elbow; in several the nature of the accident was not known.

I do not think that, from a diagnostic point of view, very much real importance attaches to the nature of the injury; our diagnosis must be based on the evidence gotten by physical examination of the affected part, and, as accurate diagnosis is indispensable to intelligent treatment, you will pardon me if I briefly allude to its more salient points.

These I think to be the presence of bony crepitus and abnormal mobility. Disability, local pain, and tenderness, ecchymosis, and swelling are common to contusions and sprains as well as to fractures, though present, as a rule, to a greater degree in the latter. We are told to see that the bony prominences, the olecranon, head of the radius, and epicondyles bear their normal relation one to the other. This is good as far as it goes: it bars out dislocation, but there is frequently fracture without appreciable displacement.

Well-localized bony crepitus and a false point of motion are the evidences on which our diagnosis must be based.

By firmly grasping the humeral shaft with one hand and seizing the condyles transversely, "rocking" the lower part strongly on the upper will determine whether the condylar portion is attached or detached. Each epicondyle and condyle may in turn be subjected to a like manipulation. Should the base be broken off, one condyle must be rocked upon the other to determine the presence of three or more fragments. If much swelling

be present it is not easy to grasp the condyles, yet I have found that steady, firm pressure will sink the fingers until they reach and hold the bony points.

Swelling obscures the outer condyle to a much greater extent than the inner. Even though the effusion be great, I have never had difficulty in grasping the latter. The manipulation should be gentle yet firm, and one should apply all due force to the bony parts. He who handles a traumatic elbow as lightly as he would if it contained eggs which he feared to break, will not, in all cases, arrive at the most accurate diagnosis.

Nor am I in sympathy with those who await a subsidence of the swelling before completing the diagnosis. It is better to work in the light than in the dark, and we can direct our remedial measures much more intelligently after learning of the integrity or lesion of the bony parts.

The examination is always more satisfactory when made under an anæsthetic, and it should be administered in all cases of doubtful diagnosis, or in those in which it does not seem advisable to subject the patient to the necessary pain. Joint-crepitus at the elbow is very misleading; when there is a moderate plastic exudation one articular surface grates upon the other in a most deceptive way. This can sometimes be obviated by having assistants hold the bones apart, but even then the force necessarily used in "rocking" the bony parts jars the joint. In these cases an anæsthetic is indispensable, and, even with its aid, diagnosis may be obscure. I have of late seen several such elbow-cases which presented themselves without luxation, yet in which, under ether, the bones of the forearm were very easily thrown backward, leaving the lower end of the humerus to project anteriorly and capable of thorough and satisfactory examination.

Treatment seeks to accomplish two prime ends. First, complete restoration of the joint-function; second, the avoidance of deformity.

Regarding the best way in which the elbow-motions may be regained, surgeons differ. The dictum was for-

merly laid down that passive motion should be begun early and repeated frequently, and the rule was thought to be a cardinal one.

The late Dr. Hamilton said of fractures through the base of the condyles: "Gentle passive motion should be applied as early as the seventh or eighth day and repeated every second or third day," while in fractures through the internal condyle he advised that passive motion be begun at the end of the first week, and that the splints be then left off. I think I am correct in supposing that this teaching is believed and followed by the larger number of practitioners to-day, and, although my observation has necessarily been limited, I do not hesitate to place myself with those who think such practice radically wrong.[1]

Do not the cases which I have shown and cited to you prove it safe to keep this joint still until such time as union is complete? In most of them the functions were practically perfect at the end of the third month, in some of them they were perfect at the middle of the second, and it is principally to demonstrate this that I have brought the subject before you.

Are like results gotten by the advocates of passive motion? It is said that the passive motion should be so slight as not to cause pain, but in each of the cases which have come to me with stiffened joint after the employment of this, the patient has averred that the surgeon's movements were painful.

Stimson[2] says: "I do not think early passive motion is necessary to prevent stiffness of the joint, and when it is painful, the pain lasting for some time, I believe it to be actually harmful by increasing and prolonging the inflammation." He also says: "The records of cases are filled with instances in which the joint has become almost or entirely rigid under treatment by passive motion, and

[1] The reader is referred to a paper by Dr. V. P. Gibney on "Immobilization in Articular Disease," published in the New York Medical Journal, vol xlviii., p. 457.

[2] Treatise on Fractures, p. 403.

then after the tenderness had ceased mobility has returned gradually under ordinary daily use of the limb." We have all seen such cases. Allis[1] says: "The sequel to these injuries is so much dreaded that authors and surgeons are most earnest in pointing out the necessity of early, and, if necessary, persistent passive motion. Some recommend that this feature be instituted even during the first week, others in the second, but all agree that it is never to be lost sight of. Upon this subject I desire only to state my own practice, not to recommend it. . . . I believe that it cannot hasten, but may greatly retard the cure."

Again, how can displacement be prevented if the parts are daily moved before there is union? The forearm bones are powerful levers through their attachment to the lower fragment, and must effect changes in its position. It was said that deformity was of no importance as long as the functions were restored. That the functions are of the greater value no one will deny, but if we can restore them without deformity it is surely our duty to do so.

The callus must be greater when the parts have been kept in motion, and this excessive deposit may of itself act as a mechanical impediment to flexion and extension.

Assuming, then, as I think we may, that deformity is more certainly avoided by keeping the parts at rest, in which position is this best effected? That a separated epicondyle is best replaced under flexion within a right angle I think nobody will deny, and I am equally sure that it is the best attitude in which to treat the transverse fracture through the epiphyseal line or through the base, traction on the forearm carefully drawing the lower fragment very well forward, as all tendency is toward its backward displacement. To be sure, this puts the triceps tendon on the stretch, but if the parts are held in place

[1] Annals of the Anatomical and Surgical Society, vol. ii., No. 8.

until the plaster dressing becomes firm they are well fixed and can hardly slip.

Dr. Allis, in the paper to which I have previously alluded, very strongly urges the position of full extension in the treatment of all of the classes, and he says that in his practice it has never resulted in what might be called deformity.

Dr. Allis adduces very ingenious arguments to show that when made splints or even roller bandages are applied in the flexed position, the broken outer condyle is sure to be drawn downward or the fractured inner condyle pushed upward, either case resulting in "gunstock" deformity.

The cases which are noted in this paper go to show that this is not always so, for nearly all were treated in the flexed position, and in but one was there the "gunstock."

And my own observation has tended to show that in fractures through the inner condyle extension favors anterior displacement of the lesser fragment, it being pushed forward by the olecranon, which strongly impinges upon it from behind.

That the gunstock deformity may be avoided by the extended position I quite admit, for then one may make the elbow-obliquity just what he desires—in short, cause it to correspond with that of the opposite limb; but this correction may, in some cases, be made at the expense of anterior or posterior displacement. I feel, however, that we are greatly indebted to Dr. Allis for showing us that extension will correct the gunstock, which is of much greater import than a slight anterior or posterior displacement; and if any given position would correct but one, I would make that one the former, always considering that the chosen angle did not hazard functional loss.

Stimson says, of the treatment of fractures through the outer condyle: "It will be found in practice that in some cases the flexed position, and in others the extended position, favors displacement of the radius, and the treatment

must be varied accordingly." I think that the rule will apply equally to the internal condyle.[1] In fracture of either I would compare the extended limb with its fellow, and, if there was a loss of elbow-obliquity, correct it by abduction and immobilize in a position of semiflexion.

In conclusion, I beg to express my thanks to Dr. W. T. Bull for kindly placing this material at my disposal, as well as for his frequent and wise counsel; also to Drs. P. E. Tieman, E. B. Dench, L. L. von Wedekind, and G. K. Swinburne, house-surgeons to the Chambers Street Hospital, for their careful and efficient assistance in the treatment of the cases.

18 East Twenty-fourth Street.

---

[1] Dr. G. W. Gay (Boston Medical and Surgical Journal, vol. cviii., p. 492) recommends that in fractures through the external condyle the elbow be acutely flexed, in order to prevent anterior displacement of the head of the radius or of the fragment itself. While I have never treated the fracture by this position I have, since reading Dr. Gay's article, in two instances temporarily placed the broken elbow at an acute angle, and in each case the fragment was markedly thrown backward by the pressure of the radial head. I have not yet met with a case of broken outer condyle in which the head of the radius had become displaced in front of the fragment.